(b) contacting said fibers with a resorcinol modified phenolic resin binder substantially free from catalyst;

(c) precoating said fibers and binder with a furfuryl alcohol resin;

(d) passing the precoated fibers through a steel pultrusion die;

(e) curing said resorcinol modified phenolic resin binder substantially free from catalyst to form a synthetic wood material, wherein said synthetic wood material is substantially free of the defects of knots, warps, or pores;

(f) cutting said synthetic wood material in the shape of a wood board, plank, or strip; and

(g) oxidative treating said synthetic wood material by flame treatment to restore color.

**REMARKS**

Claims 1-20 are in the case.

Claims 1 has been amended to more particularly point out and distinctly claim that which Applicants regard as their invention to recite curing the resorcinol modified phenolic resin binder wherein the curing is auto-catalyzed. Support for the amendment to Claim 1 is found in Applicants' specification as

originally filed on page 10 and page 14 and in Original Claims 3 and 4.

Claims 1 and 20 have been amended to more particularly point out and distinctly claim that which Applicants regard as their invention to recite providing a plurality of continuous fibers selected from the group consisting of filaments of graphite, carbon, aramid, polypropylene, polyester, and combinations of filaments of graphite, carbon, aramid, polypropylene, and polyester and orienting said fibers substantially in the longitudinal axis. Support for the amendment to Claims 1 and 20 is found in Applicants' specification as originally filed on page 10.

Claim 3 has been amended to more particularly point out and distinctly claim that which Applicants regard as their invention to recite cutting said synthetic wood material in the shape of a wood board, plank, or strip. Support for the amendment to Claim 3 is found in Applicants' specification as originally filed on page 12 and in Original Claim 20.

Claim 4 has been amended to more particularly point out and distinctly claim that which Applicants regard as their invention to recite oxidative treating by flame treatment for restoring color. Support for the amendment to Claim 4 is found in Appli-

cants' specification as originally filed on page 8 and in Original Claim 20.

Claim 8 has been amended to more particularly point out and distinctly claim that which Applicants regard as their invention to recite aramid fibers composed of Kevlar aramid fibers. Support for the amendment to Claim 8 is found in Applicants' specification as originally filed on page 10.

Claims 9, 10, and 12 have been amended to be consistent with Claim 1 as amended.

Claim 11 has been amended to correct an obvious and inadvertent typographical error.

Claims 14-19 have been amended to more particularly point out and distinctly claim that which Applicants regard as their invention to recite passivation treated synthetic wood article formed by the process of providing a plurality of continuous glass fibers oriented substantially in the longitudinal axis; contacting said fibers with a resorcinol modified phenolic resin binder; pultruding said fibers and binder into a synthetic wood article; curing the resorcinol modified phenolic resin binder after said pultruding step, wherein said curing the resorcinol modified phenolic resin binder step is auto-catalyzed; and oxidative treating said synthetic wood article. Support for the

amendment to Claims 14-19 is found in Applicants' specification as originally filed on pages 13-14 and in Original Claim 1.

Applicants gratefully acknowledge the formal acceptance of the terminal disclaimer.

Claim 20 stands rejected under 35 U.S.C. 101 as claiming the same invention as that of Claim 7 of prior U.S. Patent No. 6,228,199.

Claim 20 has been amended to recite providing a plurality of continuous fibers selected from the group consisting of filaments of graphite, carbon, aramid, polypropylene, polyester, and combinations of filaments of graphite, carbon, aramid, polypropylene, and polyester and orienting said fibers substantially in the longitudinal axis, which is different and distinct from Claim 7 of prior U.S. Patent No. 6,228,199.

For the foregoing reasons, the rejection of Claim 20 under 35 U.S.C. 101 as claiming the same invention as that of Claim 7 of prior U.S. Patent No. 6,228,199 is believed to have been overcome and is respectfully requested to be withdrawn.

Claims 1-3 and 6-19 stand rejected under 35 U.S.C. §103(a) as unpatentable over Klett U.S. Patent No. 5,605,757 (hereinafter "Klett") in view of Souders et al. U.S. Patent No. 5,395,108

(hereinafter "Souders") and Dailey, Jr. U.S. Patent No. 5,075,414 (hereinafter "Dailey").

Claims 1-3 and 6-14 have been amended to recite fibers selected from the group consisting of filaments of graphite, carbon, aramid, polypropylene, polyester, and combinations of filaments of graphite, carbon, aramid, polypropylene, and polyester.

Claim 14 and Claims 15-19 dependent on Claim 14 have been amended to recite a synthetic wood article formed by the process of providing a plurality of continuous fibers selected from the group consisting of the filaments of graphite, carbon, aramid, polypropylene, polyester, and combinations of filaments of graphite, carbon, aramid, polypropylene, and polyester; orienting the fibers substantially in the longitudinal axis; contacting the fibers with a resorcinol modified phenolic resin binder; pultruding the fibers and binder into a synthetic wood article; and oxidative treating the synthetic wood article.

The Klett disclosure teaches the use of a size to improve strength characteristics and nowhere teaches or suggests passivation. Passivation is making the surface non-reactive. Passivation treatment and strength improvement are neither equivalent, nor are they related. Therefore, it would not have been obvious

that treatments that afford strength improvement would also afford passivation.

Applicants' invention utilizes passivation treatment to increase the pH window of stability, and reaction kinetics.

At high pH, caustic attacks the glass. To prevent the attack, Applicants' invention selects a preferred coating which would not claim to be a size. The size prevents self-abrasion. The coating of Applicants' invention provides passivation.

Klett nowhere teaches or suggests employing a resorcinol modified phenolic resin binder and nowhere teaches or suggests the pultruded product to an oxidative treatment.

The Souders reference employs sanding, as disclosed by Souders, which is a mechanical phenomenon which affects only the top surface.

The Dailey reference is limited and does not have the passivation treatment step as required by Applicants' invention.

There is no motivation found in the references to combine the references of Klett, Souders, and Dailey and come up with the method of Applicants' invention.

There is no motivation found in the references to combine Klett, Souders, and Dailey and come up with the method of Appli-

cants' invention, except on the basis of reconstructive hindsight after having the benefit of Applicants' disclosure.

Assuming, but not granting or admitting, that one would have combined the Klett, Souders, and Dailey references, one would not have come up with the novel method and article of Applicants' invention nor the specific combination of elements of Applicants' invention except by using reconstructive hindsight after reading Applicants' disclosure.

The Examiner has not established a prima facie case of obviousness, and the Examiner's assumptions do not constitute the disclosure of prior art. The prior art relied upon does not disclose, suggest, or render obvious Applicants' invention, either individually or when combined.

The Supreme Court in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), focused on the procedural and evidentiary processes in reaching a conclusion under 35 U.S.C. §103. As adapted to ex parte procedure, *Graham* places the "burden of proof on the Patent Office and requires it to produce the factual basis for its rejection of an application under sections 102 and 103." *In re Warner*, 379 F.2d 1011, 1016, 154 USPQ 173, 177 (CCPA 1967).

Applicants' invention requires structural elements not taught in Klett, Souders, and Dailey.

As set forth in *In re Bond* (CAFC) 15 USPQ 2nd 1566 8/3/90, the Office Action analysis is a classical example of a hindsight reconstruction of Applicants' invention.

A retrospective view of an Examiner's assertion of so-called known art is not a substitute for some teaching or suggestion which supports the selection and use of the various elements in the particular inventive combination. *Smithkline Diagnostics v. Helena Laboratories Corp.*, 859 F.2d 878, 886-87, 8 USPQ 2d 1468, 1475 (Fed. Cir. 1988). It is well established that in deciding that a novel combination would have been obvious, there must be supporting teaching in the prior art.

"That which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown." *In re Spormann*, 363 F.2d 444, 448, 150 USPQ 449, 452 (CCPA 1966). There is no suggestion or motivation in the prior art to combine these elements as combined by Applicants. See *In re Laskowski*, 871 F.2d 115, 117, 10 USPQ 2d 1397, 1398-99 (Fed. Cir. 1989); *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143, 227 USPQ 543, 551 (Fed. Cir. 1985). The motivation to make a specific structure "is not abstract, but practical, and is always related to the properties or uses one skilled in the art would expect the [structure] to have, if made."

See *In re Gyurik*, 596 F.2d 1012, 1018, 201 USPQ 552, 557 (CCPA 1979).

See also *Fromson v. Advance Offset Plate*, 755 F.2d 1549, 1556, 225 USPQ 26, 31 (Fed. Cir. 1985) ("The critical inquiry is whether 'there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.'").

Assuming, but not admitting that a prima facie case of obviousness has been established, the burden of going forward shifts to the Applicant. Rebuttal is merely "a showing of facts supporting the opposite conclusion," *In re Heldt*, 433 F.2d 808, 811, 167 USPQ 676, 678 (CCPA 1970), and may relate to any of the *Graham* factors including the so-called secondary considerations. *Perkin Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 895-96, 221 USPQ 667, 675 (Fed. Cir. 1984); *In re Sernaker*, 702 F.2d at 996-97, 217 USPQ at 7-8.

If rebuttal evidence of adequate weight is produced, the holding of prima facie obviousness, being but a legal inference from previously uncontradicted evidence, is dissipated. Regardless of whether the prima facie case would have been characterized as strong or weak, the examiner must consider all of the evidence anew. The process is as stated in *In re Rinehart*, 531

F.2d 1048, 1052, 189 UPSQ 143, 147 (CCPA 1976): When prima facie obviousness is established and evidence is submitted in rebuttal, the decision-maker must start over. An earlier decision should not be considered as set in concrete, and Applicants' rebuttal evidence then be evaluated only on its knockdown ability. Analytical fixation on an earlier decision can tend to provide that decision with an undeservedly broadened umbrella effect. Prima facie obviousness is a legal conclusion, not a fact. Facts established by rebuttal evidence must be evaluated along with the facts on which the earlier conclusion was reached, not against the conclusion itself.

Applicants' invention provides a fire resistant and fungal/termite resistant glass, aramid, or ceramic fibers or filaments reinforced in fire and fungal/termite resistant phenolic, furanic, or ceramic matrices.

Applicants' fibers or filaments are processed by passing the fiber or filament component into a bath or vessel of the liquid resin binder. Then the resin impregnated filament is passed through one or more dies having an aperture opening of smaller dimension than that of the composite of the resin binder saturated filament component.

The die operates to wring out excess resin binder and to compress and form the resin binder saturated filament into the predetermined shape of the die.

The resin binder impregnated filament is pulled as a continuous strand from the pultrusion die.

The composite then can be cured with heat or other curing means.

The pultruded and cured product then can be cut into desired lengths.

When the artificial wood substitutes of Applicants' invention are machined or cut, the nascent surface has an appearance that is lighter than the color of the longer-lived surfaces. Thus, the nascent surface of the machined or cut artificial wood substitute may be sometimes different from the color of the longer-lived surfaces. Such a different color is a disadvantage because it detracts from the quality of visual appeal of the artificial wood substitutes of Applicants' invention.

Thus, subsequent to forming nascent surface of the artificial wood substitutes of Applicants' invention, Applicants have found that it is important to subject the machined surface to an oxidative treatment. Such an oxidative treatment is provided by a physical or chemical treatment. An example of such a physical

oxidative treatment is flame treatment. Another example of such a physical oxidative treatment is frictional rubbing. Applicants have found that flame treatment is particularly advantageous in restoring color. Nevertheless, other treatments such as treatment with chemical oxidants are used. Examples of suitable chemical oxidants are hydrogen peroxide or benzyl peroxide.

Applicants have found that it is important to precoat the substrate before impregnating with resin. The precoating can be provided by a furfuryl alcohol resin. The precoating step of the process of Applicants' invention provides for a full furfuryl alcohol interaction and full coatability of the fibers. It is an important difference that the precoating step of the process of Applicants' invention avoids any interaction wherein the furfuryl alcohol is chemically bound into the binder network.

Applicants' invention overcomes problems with additions of furfuryl alcohol in the resin binder wherein the furfuryl alcohol is tied up chemically in the resin binder, which limits interaction of the furfuryl alcohol with the fibers.

The precoating step provides for the ability to use the fibers of the substrate of Applicants' invention in hostile chemical environments, high pH, and higher temperatures. The higher temperatures provide for significantly higher throughput.

Other precoating materials are provided by coating formulations possessing high thermal stability, and examples are polyimides.

The composite of Applicants' invention is free of the natural and pest rendered defects associated with natural wood.

In one aspect, the fiber or filament of Applicants' invention is an E glass containing low amounts of alkali, high tensile strength, and high elasticity with low elongation. The glass fibers are sized in the range of about 80 to 100 X $10^{-5}$ inches in diameter. Bundles of the glass fibers contain a number of glass fibers in the range of about 100 to 5000.

In one aspect, the fiber or filament of Applicants' invention are filaments made of graphite, carbon, aramid (Kevlar), filaments of polypropylene or polyester, and combinations of these filament materials.

The resorcinol modified resin binder used in Applicants' invention is a reaction product of a resorcinol and a phenolic resole resin.

The synthetic wood appearance is provided by the resin binder of Applicants' invention and the way it is reacted. The resin binder of Applicants' invention is processed in a way so that it is auto-catalyzed, i.e., the resin binder is allowed to

react such that it is contacted with no external catalyst introduced into the resin binder stock itself. The importance of this difference is that the resin binder of Applicants' invention will minimize darkening of the resin binder with curing.

The resorcinol modified component of the resin binder of Applicants' invention provides a reddish hue to the finished article of Applicants' invention in a way to simulate the appearance of wood and provide the synthetic wood article of Applicants' invention.

Unlike prior art processes, the phenolic resin binder of Applicants' invention is not acid catalyzed. The importance of this difference is that the resin binder of Applicants' invention will not corrode a steel die.

Unlike prior art processes, the phenolic resin binder of Applicants' invention does not use a basic, e.g., alkaline catalyst. The importance of this difference is that the fiber, e.g., glass fiber, of Applicants' invention will not be weakened by the presence of the basic catalyst.

The synthetic wood of Applicants' invention is formed by impregnating the glass fiber through a resin binder bath to impregnate the fiber glass filaments with resin binder in liquid form. The impregnated filaments then are pultruded and cured.

The pultruded composite may be cut to predetermined lengths to form the synthetic wood articles of Applicants' invention.

The synthetic wood articles of Applicants' invention can be produced in a variety of different cross-sectional shapes, e.g., such as rectangular, flat, cylindrical, angular designs, e.g., by way of one example such as star shaped, or other designs, e.g., such as oval.

The synthetic wood articles of Applicants' invention can be produced in a variety of finished products, e.g., such as boards, strips, tubes, rods, or sheets.

The product and process of Applicants' invention provide a degradation resistant, strong, and light weight composite as a substitute for natural wood products.

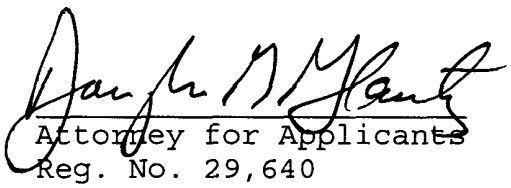
For the foregoing reasons, the rejection of Applicants' Claims 1-3 and 6-19 under 35 U.S.C. §103(a) as unpatentable over Klett U.S. Patent No. 5,605,757 in view of Souders U.S. Patent No. 5,395,108 and Dailey, Jr. U.S. Patent No. 5,075,414 is based on an improper combination of references and further is based on insufficient references and is respectfully requested to be withdrawn.

U.S. Serial No.: 09/755,778
Group Art Unit: 1771

Attached hereto is a marked-up version of the changes made to the Claims by the current Amendment. The attached pages are captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

Reconsideration of this Application is requested.

Respectfully submitted,



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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

1. (Amended) A process for forming a synthetic wood material, comprising:

(a) providing a plurality of continuous [glass] fibers [oriented substantially in the longitudinal axis;] selected from the group consisting of filaments of graphite, carbon, aramid, polypropylene, polyester, and combinations of filaments of graphite, carbon, aramid, polypropylene, and polyester;

(b) orienting said fibers substantially in the longitudinal axis;

[b](c) contacting said fibers with a resorcinol modified phenolic resin binder; [and]

[c](d) pultruding said fibers and binder into a synthetic wood article;

(e) curing the resorcinol modified phenolic resin binder after said pultruding step, wherein said curing the resorcinol modified phenolic resin binder step is auto-catalyzed; and

[d](f) oxidative treating said synthetic wood article.

3. (Amended) A process as set forth in Claim 1 further comprising [curing the resorcinol modified phenolic resin binder

after said pultruding step] cutting said synthetic wood material in the shape of a wood board, plank, or strip.

4. (Amended) A process as set forth in Claim 1 wherein said [curing the resorcinol modified phenolic resin binder step is auto-catalyzed] oxidative treating comprises flame treatment for restoring color.

8. (Amended) A process as set forth in Claim 1 wherein said [glass] aramid fibers are composed of [E glass] Kevlar aramid fibers.

9. (Amended) A process as set forth in Claim 1 wherein said [E glass] fibers can be co-mixed with [carbon, aramid, or] ceramic fibers[, or mixtures thereof].

10. (Amended) A process as set forth in Claim 8 wherein said [glass] fibers are sized in the range of about 80-100 X $10^{-5}$ inches in diameter.

11. (Amended) A process as set forth in Claim 1 [wherein said] wherein said pultruding comprises pultruding to produce a pultruded article which is substantially porosity free.

12. (Amended) A process as set forth in Claim 8 wherein said fibers are formed in bundles containing a number of [glass] fibers in the range of 100 to 5000.

14. (Amended) A passivation treated synthetic wood material comprising:

(a) a plurality of continuous glass fibers oriented substantially in the longitudinal axis;

(b) a resorcinol modified phenolic resin binding said fibers to form a synthetic wood material, wherein said synthetic wood article has been oxidative treated to restore color; and

(c) wherein said synthetic wood article is formed by the process of providing a plurality of continuous glass fibers oriented substantially in the longitudinal axis; contacting said fibers with a resorcinol modified phenolic resin binder; pultruding said fibers and binder into a synthetic wood article; curing the resorcinol modified phenolic resin binder after said pultruding step, wherein said curing the resorcinol modified

phenolic resin binder step is auto-catalyzed; and oxidative treating said synthetic wood article.

15. (Amended) A passivation treated synthetic wood material as set forth in Claim 14 wherein said synthetic wood material is in the form of a pultruded cylinder, log, rectangle, or square cut into lengths of about 0.125 inches to 12 inches.

16. (Amended) A passivation treated synthetic wood material as set forth in Claim 15 wherein said synthetic wood article has been oxidative treated by flame treatment to restore color.

17. (Amended) A passivation treated synthetic wood material as set forth in Claim 14 wherein said fibers are E glass fibers co-mixed with carbon, aramid, or ceramic fibers or mixtures thereof.

18. (Amended) A passivation treated synthetic wood material as set forth in Claim 14 wherein said fibers are formed into bundles.

19. (Amended) A passivation treated synthetic wood material as set forth in Claim 14 wherein said fibers are sized in the range of about 80-100 X $10^{-5}$ inches in diameter.

20. (Amended) A process for forming a synthetic wood material, comprising:

(a) providing a plurality of continuous [glass] fibers selected from the group consisting of the filaments of graphite, carbon, aramid, polypropylene, polyester, and combinations of filaments of graphite, carbon, aramid, polypropylene, and polyester sized in the range of about 80-100 X $10^{-5}$ inches in diameter and oriented substantially in the longitudinal axis;

(b) contacting said fibers with a resorcinol modified phenolic resin binder substantially free from catalyst;

(c) precoating said fibers and binder with a furfuryl alcohol resin;

(d) passing the precoated fibers through a steel pultrusion die;

(e) curing said resorcinol modified phenolic resin binder substantially free from catalyst to form a synthetic wood material, wherein said synthetic wood material is substantially free of the defects of knots, warps, or pores;

(f) cutting said synthetic wood material in the shape of a wood board, plank, or strip; and

(g) oxidative treating said synthetic wood material by flame treatment to restore color.